UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Programming and Data Bases for Data Analysis - 1

2627-2-E3305M014-T1

Learning objectives

Knowledge and understanding:
The course is aimed at acquiring basic skills in Python programming, focusing on the elementary data structures used in data analysis, and on relational databases.

Applied knowledge and understanding:
At the end of the course, the student will be able to express simple SQL queries and design algorithms and implement them in Python in order to process data to solve specific problems

Making judgments:
The student will learn to independently choose the most suitable tools and techniques among those learned to solve practical problems
of moderate complexity related to data manipulation and programming logic.

Communication skills:
The student will develop effective communication skills in the context of programming and databases.
He/she will be able to express technical concepts related to code, algorithms and SQL queries in a clear and comprehensible way,
both orally and in writing.

Learning ability:
The student will develop the fundamental skills for autonomous and continuous learning in the field of computer science.
He/she will be able to quickly acquire new knowledge and skills regarding programming languages ??and database management systems,
to use external resources to deepen specific topics of SQL and programming,
and to independently solve complex problems through the application of the principles learned.

Contents

The notion of algorithm, fundamental constructs in Python, elementary data structures and tables, functions, writing and reading files, SQL queries

Detailed program

1. Definition of algorithm
2. The Python language

- structure of a program
- variables and data types: bool, int, float, str, tuple, list.
- arithmetic, relational, and logical expressions.
- predefined functions: abs, len, list, max, min, range, str, sum.
- elementary instructions: assignment, return, break, continue, import.
- compound statements: if, for, while, with
- Reading and writing instructions: input, print, from text file
- definition of functions.
- Notes on the pandas library: DataFrame, input and output (read_excel, read_csv, to_excel, to_csv), indexing of a DataFrame, calculation of indicators (sum, min, max, mean, median, mode).

3. Relational databases and SQL: CREATE, DROP, ALTER, INSERT, UPDATE, DELETE,SELECT

Prerequisites

Mathematical,logical, statistical knowledge as acquired during high-school.

Teaching methods

Frontal lessons. Lessons take place in computer science lab to allow students to immediately apply the concepts explained.

Assessment methods

The assessment of learning consists of a written exam and, upon passing it, an oral exam at the teacher's discretion. The examination will assess the student's ability to use software development applications and their proficiency in solving simple problems.

Textbooks and Reading Materials

- For 1 and 2: John V. Guttag. **Introduzione alla programmazione con Python. Dal pensiero computazionale al machine learning**. Egea
- For 3 utilizzare: Angelo Chianese, Vincenzo Moscato, Antonio Picariello, Lucio Sansone. **Sistemi di basi di dati e applicazioni**. Apogeo Education. Capitoli 2 e 5

Semester

Second semester.

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION